STANDARD 2-RIPARIAN/WETLAND HEALTH

Riparian and wetland vegetation have structural, age, and species diversity characteristic of the state of channel success and is resilient and capable of recovering from natural and human disturbance in order to provide forage and cover, capture sediment, dissipate energy, and provide for ground water recharge.

Riparian/wetland habitat makes up less than one-half percent of the Great Divide Basin Report Area. Although this is a very small percentage, these areas are some of the most productive found on public lands. They are important for recreation, fish and wildlife habitat, water supply, cultural and historic values, as well as livestock production. The discussion of riparian/wetland habitat will be divided into two geographic regions, the Great Divide Basin and the Ferris-Seminoe Mountains with associated drainages.

1) Characterization:

Riparian-wetland habitat within the Great Divide Basin are described in the following groups: desert springs and seeps, and streams supported by them; snow supported seeps, springs and streams that flow out from the Atlantic Rim area on the southeast border of the basin; playa lakebeds; wetlands in the Chain Lakes area; man-made wetlands around artesian wells, and the Ferris/Seminoe systems. Streams in this area generally flow for short distances supporting riparian vegetation in these areas, before turning into dry ephemeral drainages that do not support riparian vegetation. Riparian grassland habitat types are the most common forms of vegetation found here. Less common systems include willow riparian shrublands and aspen riparian woodlands. Riparian grasslands are wetland, stream, or spring-associated grass and grass-like communities, which are maintained by water tables within rooting depth during most of the growing season. Willow riparian shrublands occur as scattered individuals or as denser communities, on wet sites that are somewhat thermally protected along drainages. Aspen riparian woodlands occur in deep, loamy soils on north and east aspects where snow drifts protect and support their moisture requirements.

Desert seeps and springs primarily support riparian grassland habitat types. Common species include Nebraska, beaked and Liddon' sedges, Baltic rush, spike-sedge, tufted hairgrass, basin wildrye, wheatgrass, saltgrass, Kentucky bluegrass, redtop, mat muhly, alkali sacaton, cinquefoil, horsetail, plantain, mint, aster and thistle. Streams may flow for short distances or for several miles from these sources. Examples within the assessment area include: Kinch-McKinney Spring, Battle Springs, Tipton Spring, Fillmore Creek, Stewart Creek, Lost Creek, and lower portions of Lost Soldier Creek. The upper portion of Lost Soldier Creek contains Geyer's and Booth willows, currant, rose, shrubby cinquefoil, and a few decadent aspen, in addition to the species already listed above. Some seeps have had reservoirs or pits constructed below them, described under the man-made wetlands section.

The seeps, springs and streams in the Atlantic Rim area of the Great Divide Basin support a mixture of riparian grassland and willow riparian shrubland habitat types. Riparian grassland species are generally the same as those listed above. The willow riparian shrubland is dominated by Geyer, Booth, sandbar, and yellow willows. Additional shrubs found here include dogwood, currant, snowberry, rose, and individual quaking aspen. The herbaceous understory generally includes Nebraska sedge, beaked sedge, tufted hairgrass, Kentucky bluegrass and redtop. The principle drainage that originates from Atlantic Rim into the Great Divide Basin is Separation Creek and associated tributaries. Adjacent to these habitats on Atlantic Rim are aspen riparian

woodlands. These sites occur on north to east facing slopes adjacent to springs, streams or ponds, typically at 6,000 to 8,100 ft. Soils are generally poorly-drained and water tables are within root depth during most of the growing season. Overstory species are aspen, willow, and limber pine. The shrub layer is more open than the willow riparian sites and is dominated by serviceberry, chokecherry, common juniper, currants, rose and big sagebrush. Other species associated with this habitat type are shrubby cinquefoil, tufted hairgrass, Columbia needlegrass, elk and other sedges, bluegrasses, wildrye, rushes, and various forbs in the herbaceous layer.

The remaining portion of the basin consists of ephemeral drainages, which flow only during spring runoff or in conjunction with intense thunderstorms. These areas do not meet the riparian standard in that they do not support wetland vegetation nor do they have hydric soils. Hydric soils are formed when there are at least two weeks of water saturation during an average year, which produces anaerobic conditions within the soil. Since all drainages within the Great Divide Basin have no external outlet, they end up at one or more playa lake-beds. During drier climatic cycles these depressional areas may lack hydrology and/or hydrophytic vegetation indicators that would identify them as wetlands. Dominant species are rhizomatous wheatgrass and annual forbs. During wet years, these sites may provide a productive and diverse composition, primarily of aquatic species and shoreline species of grasses, sedges, and rushes that can survive alternating wet and dry periods.

The most prominent natural wetland systems within the Great Divide Basin are the Chain Lakes, scattered in an east to west line about 20 miles north of Interstate 80 (picture 29-1). There are also other isolated water bodies like Stratton and Bush Lakes. These lakes and adjacent habitat support riparian grassland and open aquatic-emergent wetland habitat. Vegetation must be tolerant of salt and/or alkaline conditions. Common plant species include Nuttall's alkaligrass, alkali cordgrass, saltgrass, Baltic rush, tufted hairgrass, American bulrush, slim sedge, greasewood, arrowgrass, alkali plantain, sea milkwort, buttercup, cinquefoil, hairy goldaster, and Rocky Mountain glasswort.

Manmade wetlands occur primarily next to artesian wells and reservoirs or pits. Wetlands supported by artesian wells occur at Red Desert Well, Luman Well, and Jawbone Well (picture 29-2). Many reservoirs and pits in the basin do not hold water on a year-round basis. However, projects next to seeps such as Chicken Springs or Mud Springs do provide wetland habitat. Sedges, bulrushes and grasses are commonly occurring species, and additional species have been transplanted into these sites to increase species diversity and structure, and to speed recovery once they have been fenced for protection from grazing.

Riparian-wetland habitat in the Ferris-Seminoe Mountains area are described in the following groups: springs, seeps, and streams; natural lakes; and man-made wetlands. Riparian grassland and willow-waterbirch riparian shrublands are the most common habitat types. Less common habitat types include open aquatic-emergent wetlands and aspen and cottonwood riparian woodlands.

Springs, seeps and streams are abundant around both the Ferris and Seminoe Mountains. However, perennial water sources are more likely to be found at the edge of- and away from the mountains than in them. Larger streams include Muddy, Whiskey, Pete, Arkansas, Sand, Deweese, Tincup, Bothwell, Sunday Morning, Junk, Wood, Long, Hurt and Indian Creeks. Streams are diverse in both gradient and flow regimes, which creates greater diversity in vegetative communities and species composition. Riparian grassland is the most common type of riparian habitat, with common species consisting of Nebraska, beaked and Liddon' sedges, Baltic rush, spike-sedge, tufted hairgrass, basin wildrye, wheatgrass, Kentucky bluegrass, redtop, mat

muhly, alkali sacaton, cinquefoil, wild licorice, iris, horsetail, speedwell, mint, monkey-flower, aster and thistle. Aquatic species include pondweed, chara and buttercup species. There are also extensive areas supporting willow-waterbirch riparian shrubland habitat. In addition to the herbaceous species listed above, there is a variety of shrubs to small trees which include: Booth, Geyer, Bebb's, sandbar, and yellow willows, waterbirch, hawthorn, dogwood, currant, silverberry, rose and cinquefoil (picture 30-1). At middle and higher elevations quaking aspen can also be added to this listed, and where abundant, these sites are classified as aspen riparian woodlands. Cottonwood riparian woodlands are found on higher gradient and sometimes drier sites along Cherry, Pete, Arkansas, Sand and Morgan Creeks. Understory species include many of those already listed above, with a tendency towards those shrubs and herbaceous plants that like drier meadow habitats.

Natural lakes occur scattered through the sand dunes on the south side of the Ferris and Seminoe Mountains and along the lower end of Deweese Creek near Pathfinder Reservoir. These lakes vary from small potholes that dry up at times to perennial lakes up to 20 surface acres. They support wetland and aquatic-emergent vegetation that may include: bulrushes, cattails, sedges, rushes, grasses, sandbar willow, forbs listed above, and water milfoil and horned pondweed.

The principle man-made wetlands are small reservoirs built for livestock watering and irrigation. Bucklin Reservoir along Highway 220 just north of Muddy Gap is the largest such project and supports similar habitat types and species that occur in the natural lakes described above (picture 30-2).

Evaluation Method:

The primary method used in evaluating this standard is through a qualitative assessment procedure called Proper Functioning Condition (PFC). This process evaluates physical functioning of riparian/wetland areas through consideration of hydrology, vegetation, and soil/landform attributes. A properly functioning riparian /wetland area will provide the elements contained in the definition:

- Dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality
- Filter sediment, capture bedload and aid floodplain development
- Improve flood-water retention and ground water recharge
- Develop root masses that stabilize streambanks against cutting action (TR 1737-15 1998)

It is important to note that the PFC assessment provides information on whether an area is physically functioning in a manner that allows maintenance or recovery of desired values (e.g., fish habitat, neotropical birds, or forage) over time. PFC is not desired or future condition (TR 1737-15 1998). PFC assessments are used along with other existing information such as stream cross-sections, photo-points, and habitat assessments to evaluate this standard of rangeland health.

2) Issues and Key Questions:

The area has been in official drought status since 2000 and has had several years of the lowest precipitation on record (note record is only since 1971). How have these drier conditions have impacted many of the riparian/wetland areas in the S&G area?

Livestock and wild horse use of riparian habitats has been and continues to be the most important factor relating to riparian health within the Great Divide Basin. Livestock are the most important factor affecting riparian health in the Ferris-Seminoe Mountains.

Historic livestock grazing use that included trailing large numbers of livestock and much longer durations of use, herbicide spraying of riparian communities, trapping beaver out of the system, and the lack of upland water sources contributed to the decline in riparian conditions. Current livestock grazing use is negatively impacting establishment and/or production of woody riparian plant species such as willows, dogwood, waterbirch or cottonwood in some portions of the watershed. In wild horse herd management areas, year round grazing use on riparian areas by wild horses and seasonal use by livestock have negatively impacted riparian vegetation. Movement of animals through riparian areas can affect functionality by increasing bare ground, usually observed in the form of trails and crossings. Higher numbers or an increased duration of use will create a greater impact from bank shear and trampling, leading to more bare ground. Increased bare ground reduces the ability of the system to function properly in high flow events. In many cases, best management practices have been implemented which reduce the duration and/or change the season of grazing use for livestock. Continued refinement of these practices will address the current livestock grazing use aspect. If livestock use has been addressed, how will damaged riparian areas be improved without management or control of use by wild horses and/or wildlife?

There are certain areas within the assessment areas where hummock areas occur adjacent to riparian areas. Many of these are a factor of the soil involved and the historic long duration of livestock use that has occurred within the area. Will implementation of best management grazing practices address these areas at risk?

Vertical instability is a problem in some areas. Some of these headcuts have been stabilized within the watershed; however, there are still areas that need to be addressed or maintained. Manmade structures such as reservoirs also have instability problems due to naturally fine sediments and lack of pipes on older projects. Cutting of the spillways on reservoirs or around or through dikes are ongoing problems affecting functionality. What is practical to address these instability issues?

Another factor affecting riparian health is roads and their associated impacts on these areas. Roads that are directly adjacent to riparian systems in many cases channel sediments directly into creeks and reservoirs. In addition, improperly placed sized culverts can increase erosion directly into riparian systems. If the amount of sediment is high enough, it can reduce vegetation, reduce functionality, decrease water quality, and change the channel dynamics. Roads can also interrupt surface and subsurface flow, which can effectively change the type of riparian system from one side to the other. Can road related concerns be addressed through culverts, improved crossings, rerouting, water bars, and roadside pits or are there additional solutions that can be implemented?

Given the potential for coal bed methane development in both the Seminoe Road Project and Atlantic Rim Project area, will the groundwater that feeds the springs and seeps in the area be affected? Will the change in channel features due to discharged water result in increased erosion? If wetlands/riparian areas are created by temporary water discharge, what will happen to these habitats after this discharge ceases?

3) Current Conditions

PFC assessments have been conducted in the watershed since the mid 1990s, with the most recent assessments occurring in 2002. Documentation of riparian condition may include photo-points, channel cross-sections, ground-water wells, habitat quality assessments, and woody plant studies.

Both the Great Divide Basin and the North Platte River Basin including the areas around the Ferris and Seminoe Mountain Ranges has been drier than normal since 1997. The area has been in official drought status since 2000 and has had several years of the lowest precipitation on record (note record is only since 1971). These drier conditions have impacted many of the riparian/wetland areas in the S&G area. Since many of the wetland areas in the Great Divide Basin are fed by groundwater and many with created water sources, impact to these features is generally delayed and can be expected in the following years. The riparian/wetland areas around the Ferris and Seminoe Mountain Ranges are generally fed by sandy soils with shallower water sources especially riparian areas supported by alluvium along stream channels. The drought has made a significant difference in some of these areas, with some normally perennial lakes in the dune areas south of the mountains drying up.

Livestock grazing over the last few years has been reduced by grazing permittees due to drought conditions. However, with less water available many of these wetland/riparian areas have been less productive and may show signs of drought stress. Assessments for PFC were mostly completed in the mid to late 1990s, which was in general a wetter time period than normal. Areas are re-assessed periodically, or if there is a change in livestock management or as new areas are discovered. Five sites selected for reassessment in 2002 on the south slopes of Ferris Mountain showed little change, and the overall rating has not changed since the 1997 assessment.

LENTIC SYSTEMS

The Great Divide Basin has few perennial water sources. They primarily consist of isolated springs and seeps, in upland locations or along drainages, and as alkali lakes. More recent man-made features include a number of wells that have artesian flows, many of these locations are fenced to protect wetland vegetation and provide water sources for livestock and wildlife using troughs outside the fencing. The natural water sources have been used seasonally by livestock and year-round by wild horses and wildlife, resulting in high amounts of trampling and utilization with changes or loss of species composition. Changes in species composition include increases in undesirable (from a forage point of view) species such as Baltic rush and arrowgrass; increased amounts of grazing resistant species like Kentucky bluegrass and mat muhly; greater amounts of early successional forbs like strawberry cinquefoil and dandelion; and total loss of vegetative cover. However, the isolated nature of some of these wetland habitats may mask impacts from management changes. For example, man-made habitat around an artesian well and highway borrow area were very slow to show increases in species composition after protection from use. Plantings were then made of root material from bulrushes, sedges, grasses and cattails, which quickly expanded (pictures 32-1, 32-2). It appears that establishment of new plants from natural seed dispersal via waterfowl or other bird species is very limited in this area.

The current condition of the alkali lakes in the Chain Lakes area is meeting proper functioning guidelines. Banks are generally stable and vegetated with native species already listed in the characterization section for this Standard. Other sites meeting this standard have been fenced in the past for protection from grazing use, and include Chicken Springs and the Luman, Red Desert and Jawbone artesian well wetland habitats. The patch of cattails at a seep on lower Separation Creek is boggy enough to prevent grazing impacts. Habitat along Lost Soldier Creek west of Bairoil has been fenced into a large pasture to control cattle use. This area of bogs and seeps did

not have a principle stream channel in most locations prior to 1990, and therefore, is described in this section. Since then, excess water pumped from water wells that is not needed for oil field injection at Bairoil, is released down this drainage and has formed a channel. Sedges, grasses, rushes, and in some locations willow dominate this drainage, with good vigor, cover and site stability. Both of these areas are in proper functioning condition.

In the Sandstone allotment there was an artesian well that had been fenced out and the water diverted to a pit. In a 2002 inspection the fence was down and the water was flooding a nearby road. The fence was replaced and the pipeline and pit reconstructed. The result of which has improved this important water source and its associated habitat greatly (pictures 33-1, 33-2).

Lentic sites in the Ferris-Seminoe Mountains area include the natural lakes in the sand dunes and along lower Deweese Creek, Bucklin reservoir, and at a few smaller man-made reservoirs. These sites have good species composition (already described) and bank cover, and are in proper functioning condition. Many of the smaller natural lakes in the sand dunes have dried up or the larger lakes have been reduced in size compared to the wetter periods in the early 1980s. However, but this is due to changes in the water table unrelated to livestock grazing.

Lentic areas not meeting PFC that are livestock related:

Stewart Creek allotment:
In the Stewart Creek allotment, the 1/8 mile of lower Stewart Creek located on public land was rated as Functional At Risk with a downward trend. Factors identified that were affecting this riparian area were seasonally cattle use and year-long wild horse use. In March 2002 a gather of 300 wild horses was completed that returned the wildhorse population to the appropriate management level (AML) of 150 head. During the winter of 2002-03, the lower Stewart Creek seeps located on both public and state lands were fenced by the BLM, permittee, and Cowboy 3-Shot Foundation, to protect the water source and adjacent habitat (pictures 33-3, 33-4). Nearby water wells are pumped by the BLM and livestock operator to provide the water necessary to support both cattle and wild horses.

Cyclone Rim allotment:
Springs and seeps within the Cyclone Rim allotment (10103) were inventoried in 2002. These springs and seeps rated as non-functional or Functioning-At-Risk include Kinch-McKinney spring, Olson and Olson Reservoir in the northwest portion of the allotment and some of the springs and seeps in Battle Springs Flat located in the south-central section of the allotment (picture 33-5). Improvement work is being planned for each of the springs not improving or at PFC.
Causes were estimated to include previous excessive use by wild horses during the growing season, and in some cases complicated by livestock grazing. Springs in the south-central portion of the allotment did not show excessive grazing throughout the vegetative resource, but was high on palatable species. Springs in the northwest portion of the allotment were heavily utilized, including all herbaceous vegetation. Even with proper grazing management and proper wild horse numbers, these riparian areas would likely show heavy use due to the unique and rare characteristics of the areas and the relatively higher palatability of the plants. Fences are being proposed with possible off-site water for wildlife, wild horses, and livestock.

Jawbone allotment:
In the Jawbone allotment, there is one permanent water source called Mud Springs, which had a pit developed next to it many years ago (picture 33-6). This site is the principle water source in a

23,000 acre allotment, in addition to one well and ten small semi-reliable reservoirs. Factors identified that were affecting this wetland habitat was summer cattle use. The BLM, Wyoming Game and Fish Department, Cowboy 3-Shot Foundation, and the Rocky Mountain Elk Foundation are cooperating on exclosure fencing with off-site water development in 2003 to protect this water source and the habitat around it.

LOTIC SYSTEMS:

The only perennial stream in the Great Divide Basin is the upper portion of Separation Creek in the Atlantic Rim area. Aspen and willow riparian communities still exist which support beaver populations in some locations (picture 34-1). This area was rated as Functioning-At-Risk with an upward trend in 1998 and continues to improve. Factors identified that contributed to this rating were historic livestock trailing and gradient adjustments due to loss of beaver ponds. In the higher elevation portion of Separation Creek there have been three instream structures installed that has stabilized the stream. Beaver have used these structures to build their dams on, and continue to improve the system (picture 34-2). Healthy, vigorous sedge and rush communities stabilize the majority of this drainage. Most streambanks are lined with both obligate and facultative riparian plants that are capable of holding together the riparian area even in high flows. These plants have deep and extensive root systems that stabilize the channels and also play an important part in channel roughness during high flows and filtration of sediments. Regeneration of woody shrubs and trees is occurring with a mixed age class and vertical structure of plants. Little to no bare ground, channel sloughing, or instability in these systems is present today, with the exception of the area of Separation Creek that is to the west of the Twentymile Road. This area has a significant headcut (10-12 feet deep), however it has not been identified as a concern due to the fact that it hasn't moved upstream, vegetative stabilization is occurring, and there is a road crossing and culvert just upstream that would prevent the head-cut from moving any further.

There are numerous creeks that originate in the Ferris-Seminoe Mountains, supporting grassland, shrubland and woodland riparian plant communities. Beaver were once very common and active in this region, with remnants of old dams and gnawed off aspen trees still visible reminders of their presence. The loss of aspen habitat to conifer succession will be discussed in Standard #3 – Upland Plant Communities. A few beaver can still be found, but often in private land irrigated meadow areas. Most of the gradient readjustment and revegetation of dams and ponds that comes after the beaver have gone has occurred. However, in a few locations this process can still be observed. Most streams have good species composition and stability, due to the deep-rooted sedges, grasses and willows, which dominate these sites. Woody plant communities are diverse in species composition and vertical structure, with good regeneration of young plants where good management is in place. Near the edge of the mountains the amount of hedging on young shrubs and trees is higher, and may be attributable to more frequent use by big game species. Some encroachment into these habitats by subalpine fir can be seen, particularly along Pole Canyon Creek. Cottonwood riparian woodlands are found along portions of Pete Creek and Cherry Creek. They used to have a wider range, which may in part be due to the recent lack of high runoff events to establish new trees. Past grazing practices would also have inhibited the growth of young cottonwood trees. However, there is recruitment in the existing communities and these stands appear to be maintaining themselves. Some spring sources of streams have been fenced to protect the water source, which has also enhanced the woody plant community. In some cases where woody plants did not exist there have been plantings within these exclosures. In general, many of these streams meet proper functioning condition. However, we do want to see some

changes in a desired future condition, such as greater cover or age class structure of a particular grass, shrub or tree.

Intermittent and Ephemeral drainages
In the lower elevations of this watershed, riparian communities consist of mainly intermittent and ephemeral drainages, in addition to playa lake-beds. These communities vary from riparian herbaceous-dominated to coyote willow- dominated to an absence of riparian vegetation of any kind. In many cases, these systems are higher in alkalinity, and plant communities must be adaptive to that condition.

Along the intermittent portion of Separation Creek, significant improvement has occurred. Willows have expanded greatly along the length of this stretch as have the sedges, rushes and cattails (pictures 35-1, 35-2, 35-3). In addition, improvements along all of upper Separation Creek have greatly extended groundwater availability over a longer time period.

There are limited intermittent systems throughout the rest of the basin; , however, where there are longer periods of water availability these systems tend to have facultative wetland plants such as Nebraska sedge, bulrushes, and cattails. Those areas that are small locations around a seep-type water source are described under "Lentic" areas. The majority of the drainages in the Great Divide Basin are ephemeral with no riparian vegetation.

Lotic areas not meeting PFC that are livestock related:

All locations within this category are in the Ferris-Seminoe Mountains area.

Cherry Creek allotment
The riparian areas within the Cherry Creek allotment are not meeting the minimum standard for riparian health due to season and duration of cattle use. Located on the northwest side of Ferris Mountain, this allotment contains Whiskey, Cherry, and the lower end of Muddy Creek. Bank shear, change in species composition, heavy hedging and lack of mixed age classes in woody plants, and wide, shallow channels were factors observed in evaluating this standard. An allotment management plan (AMP) was initiated in 2000 with the permittee to address these issues and is currently being revised. The development of pasture fencing and water developments along with adjustments in the livestock grazing operation have led to more controlled season and duration of use (picture 35-1, 35-2). Several projects are still necessary to make the grazing system fully functional (ie – reliable water sources). However, duration of livestock use along Cherry Creek, the most extensive area of riparian habitat on public land, has been changed from summer-long (about four months) to a month or less in the late spring or fall.

Ferris Mountain allotment
The Ferris Mountain allotment is used by one permittee with cattle, employing a rotational grazing system across fifteen pastures for many years that has resulted in generally good range conditions. Located on the southwest side of Ferris Mountain, this allotment is primarily drained by Muddy Creek and its tributaries. However, portions of the riparian areas within the principle summer pastures are not meeting the minimum standard for riparian health due to season and duration of livestock use. Factors observed include change in species composition, bank cover, and head-cutting, which in addition to livestock use is affected by system changes to plant succession and loss of beaver in this area (and the entire mountain). Adjustments over the last several years have been made, including an AMP currently being developed to address riparian management concerns. A short cross-fence was completed by the permittee several years ago to

create a deferred-rotation grazing system on the two principle summer pastures where health issues with riparian condition exist. Several other range improvements have been developed or are planned, including another pasture fence and water developments. Numerous photopoints have demonstrated improvements in riparian condition in many areas of the allotment (picture 36-1).

Buzzard allotment
The Buzzard allotment is also used by cattle with one permittee, with multiple pastures in a grazing rotation. Located on the east end of the Ferris Mountains, this allotment includes Sand, Arkansas, and a portion of Deweese Creeks. Portions of the riparian areas within the principle summer pastures are not meeting the minimum standard for riparian health due to season and duration of livestock use. Factors observed include bank shear, change in species composition, lack of mixed age classes in woody plants, and wide, shallow channels with high amounts of sediment (picture 36-2). An AMP was implemented in the 1990s and the permittee has developed numerous water sources to support the grazing system. The AMP will be revised in the coming year in order to meet riparian proper functioning conditions.

Seminoe allotment
The Seminoe allotment was one of the earliest allotments with an AMP, developed in 1969, and converted from primarily sheep to all cattle in 1973. It is used by one permittee, has seventeen pastures, and is located on the south side of the Seminoe Mountains. Portions of Bothwell, Hurt, Rankin and Indian Springs Creeks are not meeting the minimum standard for riparian health due to season and duration of livestock use. Factors observed were bank shear, change in species composition, hummocks, and widening channels with high amounts of sediment (picture 36-3). The AMP will be revised in the coming year in order to meet riparian proper functioning conditions.

Long Creek allotment
The Long Creek allotment was inventoried for PFC in the middle nineties and all riparian areas in the allotment were found to be functioning at risk. Riparian areas within the Long Creek allotment are Sunday Morning Creek, Tincup Creek, Long Creek, Steep Creek, Meadow Creek, and the North Platte River. Since that assessment the ranch has changed hands and new management has been implemented. Two new fences have been constructed and this has created two additional pastures. Animals are now rotated though the pastures for shorter periods of time and with fewer numbers. Since the implementation of the new grazing system, reassessment of the riparian areas has indicated a marked improvement of the condition of riparian areas. Trend of all the riparian areas is upward (picture 36-4). Within the next couple of years riparian areas should reach proper functioning condition and this will happen sooner if moisture regimes return to normal. If and when that happens the allotment will be meeting standards.

Wood Creek allotment
The Wood Creek allotment is a small allotment used by one permittee, and is located on the north side of the Seminoe Mountains. Wood Creek and Sunday Morning Creek that flow through the allotment are not meeting the minimum standard for riparian health due to season and duration of livestock use. Factors observed include bank shear, change in species composition, and wide, shallow channels. Adjustments in the timing of use by livestock will be made in order to meet proper functioning condition of the riparian habitat.

4) Reference Conditions:

Reference conditions for the North Platte River Basin are taken from the historic accounts by Col. John Charles Fremont from *The Life of col. John Charles Fremont, and his narrative of exploration and adventures, in Kansas, Nebraska, Oregon and California*. His narrative includes portions of the North Platte and Sweetwater River as traveled in July and August of 1842. As Fremont travels up the Sweetwater He mentions sections of the river with willows and bright flowers near the creek. As he moves up into the foothills he notes the presence of aspen, beech and willow and the remnants of beaver dams. These conditions may have been similar to the areas around the Ferris and Seminoe Mountain Ranges.

Clarence King described the Red Desert portion of the Great Divide Basin in a *Geological Exploration of the Fortieth Parallel in 1869*, he says of this area:

"This region, and that to the north of the railroad between Washakie Station and Bitter Creek Ridges, constitutes the Red Desert, from which the railroad station takes its name. The northern portion is an almost unknown region, barren of vegetation, and almost without water, but said to contain several alkaline ponds."

5) Synthesis and Interpretation:

Although little documentation of historic reference conditions exist, there are accounts, both written and those passed down through families, that help describe the uses and impacts upon the resources currently being evaluated.

The Great Divide Basin, due to the lack of water, was not of much use to the large cattle ranches that sprang up following the railroad until the severe winter of 1886-87. However, the sheep bands that began using this country in the mid 1870s could get by on snow during the winter and moved to the forest during the summer. Dormant season use by sheep on uplands would typically have low impacts on vegetation, but during dry times the impacts on desert water holes was probably severe. The Niland Family began running sheep in this area around 1900 until the 1970s. The first account passed on to John from his father, probably from the 1930s, was about counting 31 sheep wagons in the vicinity of Hadsell's Crossing on Lost Creek, using the water here for their sheep to drink during a dry period. At 2-3,000 sheep per band of sheep, there must have been between 60,000 and 90,000 sheep watering at this site at the time. The second account was from Circle Bar Lake in the Chain Lakes region. Again, during dry times, John recalled having to water their sheep every third day at the lake and then taking them out on the rangeland to avoid mixing with other bands of sheep also coming in to water. Although not used extensively by cattlemen, there would be cattle that drifted into the basin, as well as year-round use by wild horses that would use and have some impacts on isolated, desert water sources.

For much of the Great Divide Basin, lack of water precluded homesteading and year-round use. This led to incommon use by many different sheep outfits, both local and regional, that ranged into Wyoming from Utah, Idaho and Colorado. In contrast to this, areas with water like the Separation Creek drainage could be homesteaded and developed. In the early 1900s, irrigation from Separation Creek was used extensively for hay production in the higher elevations, and even provided adequate water for growing wheat in the flats of the Red Desert.

Areas within the checkerboard allowed livestock operators to purchase the private land grazing rights from the Union Pacific railroad and essentially control the grazing on the vacant public lands intermingled with their private lands. These areas came under the management of a single livestock operator far earlier than the land used by multiple stockmen, resulting in better condition and management of the land they could treat as their own.

In the Ferris-Seminoe Mountains country, the types of livestock use were split. On the south side adjacent to the Great Divide Basin, livestock were primarily sheep run by Mahoney, Miller and other families. In the Sweetwater River valley, use was a mixture of sheep and cattle run by Grieve, McIntosh, Sun and other families. This is important to note, particularly in the years following the Taylor Grazing Act in 1934, when private allotments were established and fenced. Whereas cattle prefer riparian habitat to feed, water and lounge in, sheep prefer uplands and spend little time in riparian habitat except to water. These trends are very apparent when evaluating long-term cattle allotments, compared to long-term sheep allotments. The riparian habitat is generally in much better condition in the sheep allotments. Allotments that just recently converted from sheep to cattle will not necessarily be in lower condition if best management practices are implemented to control the season and duration of use by cattle.

An important natural element in riparian and wetland habitats that is seen very seldom described are beaver. Beaver are considered hydrologic modifiers in the PFC process. This means they can directly affect stability of those systems that have a woody component. Their dams often provide gradient control on steeper slopes, extend the streamflow period later into the year, and create more diverse vegetation and wildlife habitat. Loss of aspen habitat, trapping, and browsing of aspen and willow by cattle and elk has contributed to the reduction in beaver. There is more than adequate willow-waterbirch riparian habitat along some streams to support beavers. However, they seem to prefer irrigated hay meadows where they have to be removed. Along Lost Soldier Creek, beaver were reintroduced and are still holding on in the willow communities found there. Long-term changes in the aspen communities, which is discussed in Standard #3, would have the most benefit in expanding beaver populations and the positive impacts they can have on riparian and wetland systems.

Following the Taylor Grazing Act, grazing districts were established and priority rights for grazing determined. In addition to fencing of private allotments, it also led to adjustments in stocking rates and AUMs available for livestock use to maintain or improve range conditions. When addressing livestock management issues over the last twenty years, it has not been necessary to reduce livestock numbers to achieve resource (primarily riparian) objectives. Depending on the specific situation, best management practices for livestock grazing have been implemented on a case-by-case basis in the majority of the watershed. In some cases, many practices and improvements needed to be implemented. In others, just a slight adjustment was needed.

In addition to adjusting duration and season of use by livestock in riparian areas, additional water sources have helped to greatly improve riparian areas. Upland water developments such as spring developments, reservoirs, and pipelines reduce the dependence of livestock on riparian habitats and result in better distribution of the animals in a pasture. Specifically, spring developments protect the water source, improve water quality and flow, and provide greater flexibility in grazing rotations (picture 38-1). In some cases, pastures with riparian habitat are deferred to late summer or fall use. Pastures with primarily reservoirs and seeps are used first, saving the more reliable pastures with streams for late-season use. This has worked particularly well during drought.

Vegetation treatments, prescribed burning and herbicide applications, also improve distribution of both livestock and wildlife, while diversifying upland shrub communities and age classes. These treatments also increase water recharge into the overall riparian system resulting in higher and longer duration of flows. In some cases springs may start to flow that hadn’t prior to treatment.

To date, use of treatments within the Great Divide Basin report area has primarily occurred in the Fillmore allotment on Atlantic Rim, with one other treatment being completed in the Seminoe allotment on the east edge of the Great Divide Basin.

Fencing has been used to reduce duration of grazing on riparian habitats within most allotments. For the most part, there are few exclosures (besides spring/seep developments) within the basin (picture 39-1). Managing livestock use across the watershed by strategic placement of fences and other improvements has resulted in decreased grazing duration on riparian communities overall without the need for exclusion, complete rest, or decreasing AUMs.

The principle impacts of livestock management upon the health of riparian-wetland habitats, are long duration of use (two months up to all summer) and hot-season use (primarily late June through early September). Historic (long-term) livestock use in this manner has led to many of these areas being dominated by upland grass species such as Kentucky bluegrass, redtop, and mat muhly that are adapted to heavier grazing use. Upland forbs and grass species resistant to grazing consequently increased along stream channels. These species may endure overgrazing but provide very little riparian stability. They have shallow roots that are not capable of stabilizing soils adjacent to riparian areas especially in high flows. With only upland species protecting the streambank, bank sloughing, bare ground, and vertical cutting were commonly observed results. Platts et al. (1987) states that the highest rating for streambank alteration is when less than 25 percent of the streambank is false, broken down, or eroding. Where BMPs for livestock grazing have been implemented, riparian herbaceous communities have responded quickly. Early successional plants such as spike-sedge, brookgrass and creeping potentilla respond initially by increasing in bank cover and encroaching into the stream channel. Then sedges, rushes and desired grasses begin to expand and later dominate the riparian community. Shortening duration of use, frequency of use, and timing of use has resulted in a vigorous, productive and, most importantly, stable vegetative communities (pictures 39-2, 39-3).

Examples of two allotments where more intensive management has been implemented are described below:

The Bar Eleven allotment is located on the north side of the Ferris Mountains and contains portions of Pete, Rush, and the east fork of Cherry Creek. Historically used by the Sun Family from the late 1800s until 1996, it is now controlled by Handcart Ranch Corporation. Prior to 1985, all three of these creeks were in one summer pasture used by cattle from June through September. Streambanks were dominated by Kentucky bluegrass and other shallow-rooted grasses that led to sloughing of banks and widening of channels. Regeneration of willows, waterbirch, cottonwood and aspen were slow or not occurring due to heavy browsing by cattle. By implementing management tools such as pasture fencing, upland water development, and instream structures, the riparian area has greatly improved while maintaining livestock use. Willows, waterbirch, dogwood and silverberry are examples of woody shrubs that have expanded in height, area and age class as a result of management changes (pictures 39-4, 39-5). Pasture fencing is just one of many tools used to improve riparian areas(picture 39-6). This stream system and others throughout the region are often dominated by sedges, with Nebraska sedge the most common and important species. It is a deep-rooted, rhizomatous plant that helps to stabilize banks, is productive, and very nutritious (39-7). Another species of interest is American mannagrass. Severely reduced by season-long cattle use, this plant species is observed along most streams where rotation and deferred rotation grazing systems have been implemented. It is similar to Nebraska sedge in terms of helping stabilize banks, being nutritious, and is easily observed with its big flowering head waving three to four feet in the air along creeks.

The Fillmore allotment is grazed by one permittee, PH Livestock Company, and contains most of the headwaters of Separation Creek along Atlantic Rim. Originally, this allotment was basically just one large pasture that was used by cattle, sheep and horses. It was also a heavily used trailing area, which impacted certain areas of the allotment greatly. In 1987, PH initiated a rotational grazing system and associated range improvements. There are now eight pastures, spring developments and cleaned-out reservoirs, and vegetation treatments. By shortening duration of use, especially along riparian areas, both woody and herbaceous species have responded tremendously (40-1, 40-2). PH Livestock, in conjunction with the Cooperative Extension Service County Agent, has established a monitoring program that has helped to provide BLM the necessary information to evaluate and confirm these achievements in healthy rangeland management. Documented improvement in plant vigor, plant density, and species composition has not only benefitted wildlife as can be seen, in part, by increased elk numbers in the Sierra Madre herd, but it also afforded a permanent increase in AUMs of 25% on the Fillmore allotment. This was the first increase in permitted AUMs in the Rawlins Field Office for fifteen years.

In the wild horse herd areas, the issues are much more problematic. Expansion of horse numbers to several times the AML and no control of their use results in the degradation of important riparian areas. Livestock use is being addressed; however, until wild horse management becomes more than just periodic gathers, the condition of riparian and wetland habitats will continue to suffer. Chicken Springs is one example of a project requiring protective fencing with alternative water development within the Stewart Creek wild horse HMA (pictures 40-3, 40-4). The maintenance of wild horse numbers at appropriate management levels is a vitally important step.

Drought conditions may result in lower groundwater tables in the years ahead and may impact the water available to maintain lentic areas. This has been observed in shallow aquifers, especially the unconsolidated sand aquifers along the southern portion of the Seminoe and Ferris Mountains. Aquifers with less transmissivity (the ability of water to move through a system) may show more long term or delayed impacts from the drought.

The development of natural gas from coalbeds (CBM) produces water of varied quality and may be discharged year around. Surface discharges into ephemeral systems change the physical hydrology and will result in channel adjustments. Channel adjustments result in erosion and increases in sediment yields. This potential erosion as well as the increased availability of water could change lotic areas by eroding bank sides and possibly creating headcuts, while at the same time creating the hydrologic conditions necessary for wetland plant establishment. The availability of water in some allotments may be used as a tool to improve the use of water sources for livestock management. There may be opportunities to create additional water sources in the uplands and improve uses in riparian/wetland areas. With CBM development it will be important to restore channels and reservoirs that cannot be sustained with natural water levels, or create water sources to feed the infrastructure developed. There is the potential for both positive and negative impacts to riparian/wetland areas, and these impacts will be addressed through the planning process for each CBM project.

6) Recommendations:

There has been a tremendous improvement in riparian/wetland condition within the assessment area over the last 15 to 20 years, however, there are still some specific areas that need attention. Allotments containing riparian/wetland habitat that do not meet this standard have been described previously and include: Stewart Creek, Cyclone Rim, Jawbone, Cherry Creek, Ferris Mountain, Buzzard, Seminoe, Long Creek, and Wood Creek allotments. For lotic systems that are not meeting the minimum standard, there are 62 miles out of a total 128 miles. In lentic sites, there

are 196 acres of a total 2,161 acres, that do not meet the minimum standard. For riparian systems along streams and creeks, lotic systems, only those portions of streams and creeks that have riparian on BLM land were included. The non-riparian lengths and portions of streams and creeks not on BLM land were not assessed. For the Lentic values, the total acres of waterbodies and wetland features were calculated. For example a lake with a portion of the shore line as wetland was talleyed for the entire portion of the lake that could exhibit open water or wetland characteristics.

Most of the lentic and lotic sites not meeting the standard have been, or are in the process of being addressed in management plans or as range improvement projects. Continued progress in grazing management of livestock and wild horses (where they are present) will ensure further improvement of all riparian areas within this area. Although there are areas where desired future condition is yet to be reached in woody species dominance and composition in the upper watersheds, these areas still meet the minimum standard of rangeland health. Other than the specific allotments listed previously, the remainder of the allotments within this assessment area are meeting Standard #2 – Riparian/Wetland Health.

Specific recommendations are:
Continue to implement or manage using BMPs for livestock grazing. This primarily means controlling the season, duration, and distribution of livestock use to meet desired resource objectives for riparian habitats. Specific dates and timing of use must be determined on a case-by-case basis. Methods to achieve this include, but are not limited to: herding, additional fencing, water developments, and vegetation treatments. Address trespass livestock problems where needed.

The numbers of wild horses in the assessment area must be maintained at AML. This will allow the proper assessment and evaluation of whether this AML is a reasonable number of wild horses to manage for in conjunction with other users while still meeting rangeland health standards and vegetative objectives.

Continue existing projects to protect riparian habitat and provide off-site water for wild horses and livestock.

Identify and correct impacts from improved roads, including water flows and erosion into riparian systems. Two-tracks that are negatively impacting riparian areas should be identified and addressed.

In areas where produced water from CBM development occurs, manage the placement of new water sources to meet livestock and wildlife management objectives. Where possible, create new water sources to maintain beneficial uses from CBM discharged water. Plan for reclamation of reservoirs and channels that receive CBM resources when discharge ceases. Make sure CBM water management plans meet the livestock and wildlife management goals for individual areas.

Continue plantings where needed within the watershed. Species diversity and vertical structure of wetland and riparian communities can be easily enhanced through vegetative plantings. When just a few individuals are planted, they establish exceedingly well.

Continue to expand the beneficial practices that improve riparian health and maximize public involvement and education regarding resource issues.